

Increasing blue light from LEDs reduces leaf length in kale

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Introduction

In spite of years of research, the effect of light quantity (intensity) and quality (color) on plants remains poorly understood. Light emitting diodes (LEDs) now facilitate this research because of their narrow band wavelength. Blue light (400-500 nm) has been known to reduce leaf expansion and petiole elongation in some crops (Cope and Bugbee, 2013; Cope et al, 2014; Snowden et al, 2016).

Kale is one of seven vegetables in the species *Brassica oler1810acea* and was chosen as a representative for the species because of its nutrient value.

Materials and Methods

The system included 16 chambers; eight chambers at low Photosynthetic photon flux density, (PPFD; 200 $\mu\text{mol m}^{-2} \text{s}^{-1}$) and eight at high PPFD (500 $\mu\text{mol m}^{-2} \text{s}^{-1}$). Kale seeds were pregerminated and then transplanted into media containers. Plants were harvested 21 days after emergence.



Dwarf Siberian Kale



Conclusions

Of all the parameters tested, only leaf length was affected significantly with increasing blue light. There was no significant effect on fresh or dry mass, percent dry mass, leaf area or specific leaf area.

Kale is less sensitive to blue light than lettuce, tomatoes and radishes but Kale is more sensitive than wheat (Snowden et al, 2016).

Future Research

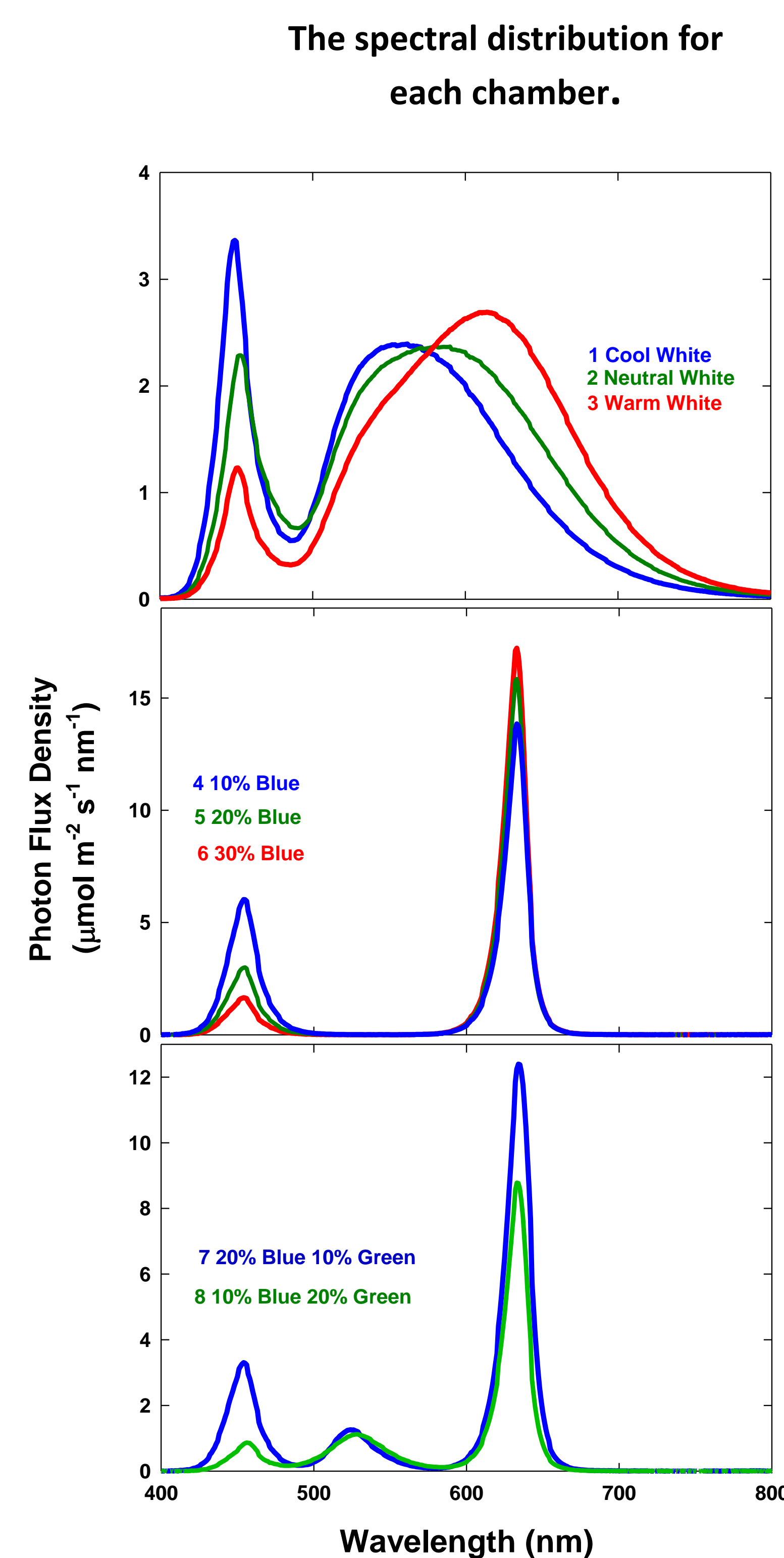
We are now studying the effect of blue and green light on anthocyanin synthesis in red lettuce cultivars.

References

- Cope, Kevin R., and Bruce Bugbee.(2013) *Spectral Effects of Three Types of White Light-emitting Diodes on Plant Growth and Development: Absolute versus Relative Amounts of Blue Light.* *HortScience* 48.4: 504-09.
- Cope, Kevin R., M. Chase Snowden, and Bruce Bugbee. (2014) *Photobiological Interactions of Blue Light and Photosynthetic Photon Flux: Effects of Monochromatic and Broad-Spectrum Light Sources.* *Photochemistry and Photobiology* 90 : 574-84.
- Snowden MC, Cope KR, Bugbee B (2016) Sensitivity of Seven Diverse Species to Blue and Green Light: Interactions with Photon Flux. *PLoS ONE* 11(10): e0163121. doi:10.1371/journal.pone.0163121

Chamber % of total Light
Blue Green Red

Chamber	Blue	Green	Red
1	27	48	25
2	19	46	45
3	11	41	48
4	10	0	90
5	20	0	80
6	30	0	70
7	20	10	70
8	10	20	70



Data are the mean of three replicate studies

